

NOTE ON THE OCCURRENCE OF *LEPIDODENDRON*
 IN UPPER DEVONIAN ROCKS AT MOUNT LAMBIE,
 NEAR RYDAL, NEW SOUTH WALES.

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As far as the authors are aware, the occurrence of *Lepidodendron* in Australia in rocks, for the Devonian Age of which there is strong evidence, has not hitherto been proved. The object of the present note is to show that the result of recent examinations by the authors of the neighbourhood of Mount Lambie in New South Wales proves that a species of *Lepidodendron* occurs there in rocks probably of Upper Devonian Age.

The literature on the subject of *Lepidodendron australe* has been well summarised by Mr. R. Etheridge, jun., in an article contributed to the Records of the Geological Survey of New South Wales.*

According to the above article, William Carruthers published the first description of an Australian *Lepidodendron*, under the name of *L. nothum*, Unger. McCoy next described a species of this genus from the Avon River, Gippsland, Victoria, as *Lepidodendron australe*. Carruthers' specimens were forwarded by the late R. Daintree from Mount Wyatt, Canoona, and the Broken River, in Queensland, and were considered by him to be of Old Red Sandstone Age.

Mr. Etheridge gives the age of the Avon River Sandstones as Lower Carboniferous, but Mr. R. A. F. Murray, in his "Geology and Physical Geography of Victoria,"† classes the Avon River

* Records Geological Survey of New South Wales, Vol. ii. Part 3, p. 119.

† Geology and Physical Geography of Victoria, p. 78.

Sandstones as Upper Devonian, admitting, however, that there is an immense unconformability between them and the Middle Devonian Rocks, the latter being nearly vertical in places where the former are nearly horizontal.

On page 67 (*loc. cit.*) Mr. Murray states:—"It is highly probable, therefore, judging from their stratigraphical position, that the Avon Sandstones are—as indicated by Professor McCoy on palæontological evidence—of Lower Carboniferous Age, or passage beds in that direction upwards from the Upper Devonian beds."

Mr. Etheridge contends that Carruthers' specimens, so-called *L. nothum*, and McCoy's *L. australe* are identical, and should therefore both be termed *L. australe*. Professor McCoy has indicated that there is a close relation between *L. australe* and *L. tetragonum*, Sternb., of the European Carboniferous.

Mr. R. Daintree has stated that in Queensland strata yielding *Lepidodendron* at Mt. Wyatt are interstratified with *Spirifera disjuncta* beds; no detailed description or figure, however, is given of these Spirifers.

The Rev. W. B. Clarke states: "So far as *Lepidodendron* is concerned, that plant occurs in some places in association with beds that are decidedly younger than any called Devonian; near Pallal, on the Horton River, and on the Manilla River, in Liverpool Plains, . . . and at Goonoo Goonoo, on the Peel River, in New South Wales, it occurs in fine grey sandstone with ferns and *Sigillaria*, in close proximity to beds of marine fossils, which are certainly Lower Carboniferous."

This conclusion is quite in accord with the evidence collected by Mr. J. Mackenzie, F.G.S., the Government Examiner of Coal-Fields, who showed Mr. Etheridge and one of the authors about three years ago a slab of rock obtained by him *in situ* in the Stroud district, showing a species of *Lepidodendron* associated with an undoubted Carboniferous marine fauna. At the Great Star River also, in Queensland, we have the authority of Mr. Jack and Mr. Etheridge for stating that *Lepidodendron* is there associated with a Carboniferous fauna.

Mr. Etheridge, at the conclusion of his able article on *Lepidodendron australe*, states that at Mt. Lambie there appears to be an insensible gradation, so far as our present knowledge shows, from beds of Upper Devonian Age into those of Lower Carboniferous, as in Victoria. His conclusions, if summarised, amount to this—that *Lepidodendron australe* is undoubtedly of Carboniferous Age in some parts of Queensland and New South Wales. In Victoria it is probably Lower Carboniferous in the Avon River Sandstones, and at Mt. Lambie in New South Wales and Mt. Wyatt in Queensland, probably Carboniferous, possibly Devonian, but of the latter Age at the time when he wrote there was no absolute proof.

Mr. Clunies Ross, B.Sc., of Bathurst, in a paper read before the Hobart Meeting of the Australasian Association for the Advancement of Science, summarising our knowledge of *Lepidodendron* in New South Wales, stated that *L. Volkmannianum* and *L. Veltheimianum* were probably of Carboniferous Age in Eastern Australia, but that, while admitting that *L. australe* was, at some of the localities where it was known to occur, of Carboniferous Age, he considered that, in the neighbourhood of Bathurst, at any rate, it was probably Devonian. This latter conclusion was based on the evidence collected by himself at a locality 16 miles from Bathurst, where he had discovered a drift piece of *Lepidodendron* under circumstances which led him to the conclusion that it had probably been derived from a geological horizon below that of the marine Devonian brachiopoda of that locality.

With a view of trying to set at rest the important question as to whether *Lepidodendron* descends into true Devonian rocks in Australia, the authors recently spent four days in exploring the country in the neighbourhood of Mt. Lambie. For the first two days not a single specimen of *Lepidodendron* could be discovered, but on the third day about twenty specimens of *Lepidodendron australe* were discovered by us *in situ* near to the locality where similar specimens had been previously obtained by the Rev. W. B. Clarke and the late Government Geologist, Mr. C. S. Wilkinson; and about six

specimens were discovered *in situ* by us at a spot about half a mile nearer to the Brachiopod Sandstone of Mt. Lambie than the previous locality. This latter locality is distant only about one-quarter of a mile in a direct line from what appears to be the uppermost Marine Devonian Bed in that district.

This horizon would be about, perhaps, 700 or 800 feet above the top of the Marine Devonian Beds. Mr. C. S. Wilkinson has stated elsewhere that he considered that the *Lepidodendron* horizon approached within about 1000 feet of the top of the Marine Devonian Rocks.

So far, all the specimens found by us were large varieties four or five to six inches in diameter, and probably all referable to *Lepidodendron australe*.

On the fourth day of examination we found an obscure cast of *Lepidodendron* associated with Marine Devonian fossils in such a position as to leave no doubt that the loose angular block in which it was imbedded had rolled down from a horizon many hundred feet below the level of the uppermost of the *Spirifera disjuncta* beds. The cast being an obscure one, it would probably be impossible to determine the exact species of *Lepidodendron* to which it belongs, though it certainly appears to be closely allied to *Lepidodendron australe*, if not identical with it.

On the day before that on which we found the above specimen near Mt. Lambie, Mr. Clunies Ross discovered a specimen of "*Lepidodendron australe*" in a large block of Marine Devonian Sandstone at the locality previously examined by him 16 miles from Bathurst. The two discoveries were therefore made almost simultaneously, and the results confirm one another, so that it may be concluded that a *Lepidodendron*, probably *L. australe*, extends downwards into the true Devonian rocks of Australia.

The fact may be mentioned here that a species of plant apparently allied to *Lepidodendron*, though its very imperfect state of preservation renders its identity uncertain, was found by the authors *in situ* in a bed of quartzite which must be at least a thousand feet below the horizon of the uppermost *Spirifera*

disjuncta bed. This imperfectly preserved and undescribed fossil plant is among the specimens exhibited to-night.

These discoveries do not disprove, therefore, any conclusions previously arrived at as to the age of *Lepidodendron* in Australia, but should help to carry the inquiry a stage further back into the past history of the world's plants. The obvious inference is either that some variety of *Lepidodendron* in Australia descends into the Upper Devonian, or that *Spirifera disjuncta* ascends into the Lower Carboniferous.

The fact might be mentioned here that Mr. William Anderson, Government Geological Surveyor, and Mr. P. T. Hammond, Geological Field Assistant, have lately discovered *Lepidodendron australe* at a new locality at Back Creek, near Major's Creek, in New South Wales, associated with a marine fauna of Upper Devonian or Lower Carboniferous affinities. The results of their explorations in this district, when elaborated, should therefore form an important contribution to our knowledge of the geological range of *Lepidodendron australe* in New South Wales.